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John F. Kennedy Space Center, Safety, Reliability, Maintainability and Quality Assurance, Survey and Audit Program

KSC Survey and Audit Working Group
John F. Kennedy Space Center, NASA

Technical Memorandum 109208

November 1994

FORWARD

The Survey and Audit Working Group was assembled to establish, train personnel, and implement a process oriented Survey and Audit Program that monitors and measures capability, compliance, effectiveness, and corrective action for safety, reliability, maintainability, and quality -- both in "doing" (engineering, operation, maintenance) and "assuring" (SRM&QA) activities. The Survey and Audit Working Group consists of representatives from many diverse organizations who each have various degrees of Survey and Audit responsibilities. This Survey and Audit Program Plan was written by representatives from each of the organizations listed below. These representatives, by signing below, give their concurrence to the Plan and its requirement to provide an improving Survey and Audit Program at the John F. Kennedy Space Center.

NASA (RM-POL)

NASA (RM-ENG-3) 6/9/94

~~ASSI~~ 6/9/94

EG&G 6/9/94

LSOC 6/9/94

MDSS 6/9/94

ROCKETDYNE

ROCKWELL 6/9/94

KSC SURVEY AND AUDIT PROGRAM

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SECTION I

INTRODUCTION

1.1 PURPOSE AND APPLICABILITY

This document establishes and defines the program applicable to the John F. Kennedy Space Center (KSC) for conducting surveys and audits of Safety, Reliability, Maintainability, and Quality (SRM&Q) activities, and SRM&Q Assurance activities. The program provides standardized terminology, uniformity of survey and audit operations, compliance and process assessments, and indicators which monitor and measure capability, compliance, effectiveness, and corrective actions. The program is applicable to KSC civil service and contractors and describes the assessment process, identifies metrics, specifies required skills training, and provides guidance for implementation.

1.2 SCOPE

This program applies to all primary contractor and civil service organizations responsible for implementing Safety, Reliability, Maintainability, and Quality requirements at the Kennedy Space Center. The program has implications for off-site vendors and suppliers.

1.2.1 On-Site Elements/Subordinate Organizations

All organizations with Safety, Reliability, Maintainability, and Quality Assurance responsibilities or having processes which impact the success of KSC mission goals and objectives shall be subject to audits, surveys, and assessments as defined herein.

1.2.2 Off-Site Vendors/Suppliers

All vendors and suppliers with Safety, Reliability, Maintainability, and Quality Assurance responsibilities written into their contract shall be subject to audits, surveys, and assessments as defined herein.

1.3 APPLICABLE DOCUMENTS

KHB 5310.1, Reliability, Maintainability and Quality Assurance Handbook

KMI 1710.1, Safety, Reliability, Maintainability and Quality Assurance Programs

KPD 8710.1, KSC/Safety, Reliability, Maintainability and Quality Assurance Programs

K-RQ-0001.3.1, NASA KSC Assurance Sampling and Measurements Manual

NHB 1700.1(VI-B), NASA Safety Policy and Requirements Document

NHB 5300.4 (1D-2), Safety, Reliability, Maintainability and Quality Provisions for the Space Shuttle Program

NHB 5300.4 (1B), Quality Program Provisions for Aeronautical and Space System Contractors

NSTS 22579, Space Shuttle Program SR&QA Survey Program Plan

1.4 DEFINITIONS

Audit	A systematic, independent, official, examination and verification of records, and other objective evidence, of work performed, of the process, or of the process requirements to determine compliance to requirements, to assess the effectiveness of implementation, and to identify potential improvements.
Auditor/Surveyor	An individual qualified through training and experience to perform surveys and audits. As used herein, the term auditor applies to both auditor and surveyor.
Auditor, Certified	An auditor certified by management as having the training identified in Section IV, paragraph 4.2.1, of this plan.

Auditor, Senior — An auditor certified by management as having the training identified in Section IV, paragraphs 4.2.1 and 4.2.2.

Findings — Documented results of investigations and evaluations which are based on substantiating evidence. A Finding may be:

a. A "Nonconformance" identifying a deviation from requirements.

b. An "Observation" identifying a condition or practice that should be corrected to improve a process.

c. A "Verification" indicating compliance to a requirement.

d. A "Commendation" recognizing outstanding performance.

Survey — An independent, official, comprehensive evaluation or assessment of capabilities to ensure that programmatic systems are adequately documented, effectively implemented, and suitable for achieving requirements and desired quality objectives.

KSC SURVEY AND AUDIT PROGRAM

SECTION II

BACKGROUND

The critical nature of launch preparations at the Kennedy Space Center requires a high degree of checks and balances to assure work is properly accomplished. One of these checks and balances is a proactive government and contractor survey and audit program that provides management with an evaluation of Safety, Reliability, Maintainability, and Quality Assurance (SRM&QA) Programs. In the past, the major thrust of government and contractor surveys and audits was an evaluation of compliance to requirements. However, the KSC Safety, Reliability and Quality Assurance Directorate (RQ) recognized the inherent limitations in relying solely on compliance oriented surveys and audits. The survey and audit program should include assessment elements that can monitor and measure capability, effectiveness, and corrective action. Therefore, in 1991, RQ management made a presentation at a NASA Headquarters (Code Q) chaired R&QA Directors meeting emphasizing a process oriented survey and audit program for the Centers. NASA Headquarters expressed interest in the concept and KSC has been the lead Center in developing this improved approach.

During the implementation of the Structured Surveillance Program, a requirement was defined to provide assessments of the effectiveness of Structured Surveillance Program elements. Therefore, a "Structured Surveillance Survey and Audit Working Group" was established, and the first meeting was held on June 21, 1992. The working group was comprised of KSC civil service and contractor SRM&QA representatives involved in conducting off-site and on-site surveys and audits. After analyzing the various presentations involving the current methodology employed by the Civil Service and contractor organizations in performing surveys and audits, it became apparent that there were more differences than similarities. To effectively support the Structured Surveillance Program, a KSC Survey and Audit Program, with some degree of standardization, would be required so that statistical data would be valid across organizational interfaces. In addition, since compliance audits are limited along organizational lines, a broader "process oriented" survey and audit methodology would be needed. It was recognized by the working group that improvements in the survey and audit methodology would have a beneficial effect on assessing engineering, operations, maintenance, and SRM&QA programs.

Therefore, the members agreed that the working group's original objectives should be expanded to develop a KSC Survey and Audit Program (including process oriented audits) for both on-site and off-site assessments. The title for the working group was changed to the "KSC Survey and Audit Working Group."

KSC SURVEY AND AUDIT PROGRAM

SECTION III

APPROACH

3.1 GENERAL

The survey and audit function is a service function which intends to facilitate the attainment of Safety, Reliability, Maintainability and Quality (SRM&Q) by providing leadership and management of the survey and audit process. The function encompasses on the following activities:

A. The attainment of SRM&Q within peer organizations through surveys and audits. For example, the Payloads Management and Operations, Shuttle Management and Operations, and Installation Management and Operations Directorates, are responsible for SRM&Q self-assessments and for requesting surveys and audits by the Safety, Reliability and Quality Assurance Directorate. The Safety, Reliability and Quality Assurance Directorate is responsible for surveys and audits of SRM&Q on a periodic basis in the absence of requested services sufficient to provide adequate assessments. The intent is to independently monitor and measure processes by involving SRM&QA in project management, engineering, manufacturing, operations, and maintenance.

B. The attainment of SRM&Q within contractor organizations subordinate to peer organizations through surveys and audits. For example, the Safety, Reliability and Quality Assurance Directorate is responsible for monitoring, measuring, and evaluating SRM&Q in engineering, operations, and maintenance activities of the Payload Ground Operations Contract (PGOC), Shuttle Processing Contract (SPC), Base Operations Contract (BOC), etc.

C. The attainment of SRM&Q Assurance (SRM&QA) in contractor organizations subordinate to peer organizations through surveys and audits. As an example, this element of the activity would include the civil service monitoring and measuring of PGOC, SPC, and BOC SRM&QA and all of the KSC off-site survey and audit activities.

D. The attainment of SRM&Q Assurance (SRM&QA) through surveys and audits of SRM&QA processes and SRM&QA self-assessment activities.

E. Special surveys and audits of processes, civil service organizations and contractor organizations when management decides such action is warranted due to results of routine monitoring or other significant events.

3.2 CONCEPT

The KSC Survey and Audit Program evolved from a program focused primarily on determining conformance to requirements to a program which evaluates the effectiveness of processes. The performance of surveys and audits is accomplished by a team composed of a leader (Senior Auditor) trained in planning, organizing, scheduling, closing, and reporting on survey and audit results; and subject matter experts (Auditors) trained in interviewing, investigating, examining records, analyzing; and documenting findings. On an as needed basis, this team is augmented by subject matter experts not trained as auditors. In these cases, the individuals are under the guidance of an auditor.

3.2.1 Compliance Oriented, Vertical Assessment

The previous SRM&QA survey and audit function had provided assurance of compliance to requirements and was "compliance" oriented. Requirements are imposed in a contract and the contractor maintains an SRM&QA organization in its management structure through which the responsibility for assuring compliance to requirements is passed down. Surveys and audits were generally performed on the SRM&QA organization to verify that contract requirements were passed down through procedures. The survey and audit method was a "vertical" assessment of the SRM&QA organizations' performance and compliance to requirements.

The present evaluation of compliance does not consider the relevancy of requirements. Today's continuous improvement environment challenges people to create innovative enhancements. A survey and audit function that strictly forces compliance to requirements is counterproductive to continuous improvement. The survey and audit function has been improved to include an assessment of requirements to ensure that they are adequate, necessary, and achieve the desired goals and objectives. Compliance to a requirement must add value to the product or system.

3.2.2 Process Oriented, Horizontal Assessment

The improved survey and audit methodology includes the evaluation of process conformance and effectiveness. Processes are the sequences of events and tasks leading to an end product and are generally documented in procedures that detail the performance responsibilities of all organizations involved. Since the "process" oriented survey and audit crosses contractor and organizational boundaries, it is considered a "horizontal" assessment.

By evaluating processes, all organizations are included in the examination and analysis. Process analysis is multifunctional (engineering, operations, SRM&QA) in order to properly assess effectiveness and implement improvements. The "process" oriented survey and audit function seeks solutions to problems and their root causes, thereby increasing the occurrence of first-time quality.

3.3 PROGRAM DESCRIPTION

The KSC Survey and Audit Program provides uniformity between the various organizations performing survey and audit activities at KSC. In addition to improving these activities by emphasizing process evaluation and assuring value added compliance to requirements, the program fosters continuous improvement through the use of measurement indicators (see Section V), provides for competent execution through skills training (see Section IV), and establishes a centralized scheduling and reporting effort to allow enhanced coordination and feedback between organizations performing surveys and audits at KSC.

3.3.1 KSC Organizations Performing Surveys/Audits

The Safety, Reliability and Quality Assurance Directorate (RQ) has the primary responsibility for providing SRM&QA surveys and audits at KSC. The function is performed by an organization within the Mission Assurance Directorate (RM), the Procurement Assurance and Audit Integration Branch accomplishing off-site and on-site surveys and audits. In addition, KSC Operational Directorates (TM, CM, and IM) have prime contractors that are responsible for performing on-site and off-site surveys and audits.

Diagrams 1A and 1B show the responsibilities and functions of the two levels of organizations at KSC involved in survey and audit activities. The Survey and Audit Branch provides assessments for compliance and effectiveness of NASA KSC Operational Organizations (including the

KSC Survey/Audit Organizations
NASA

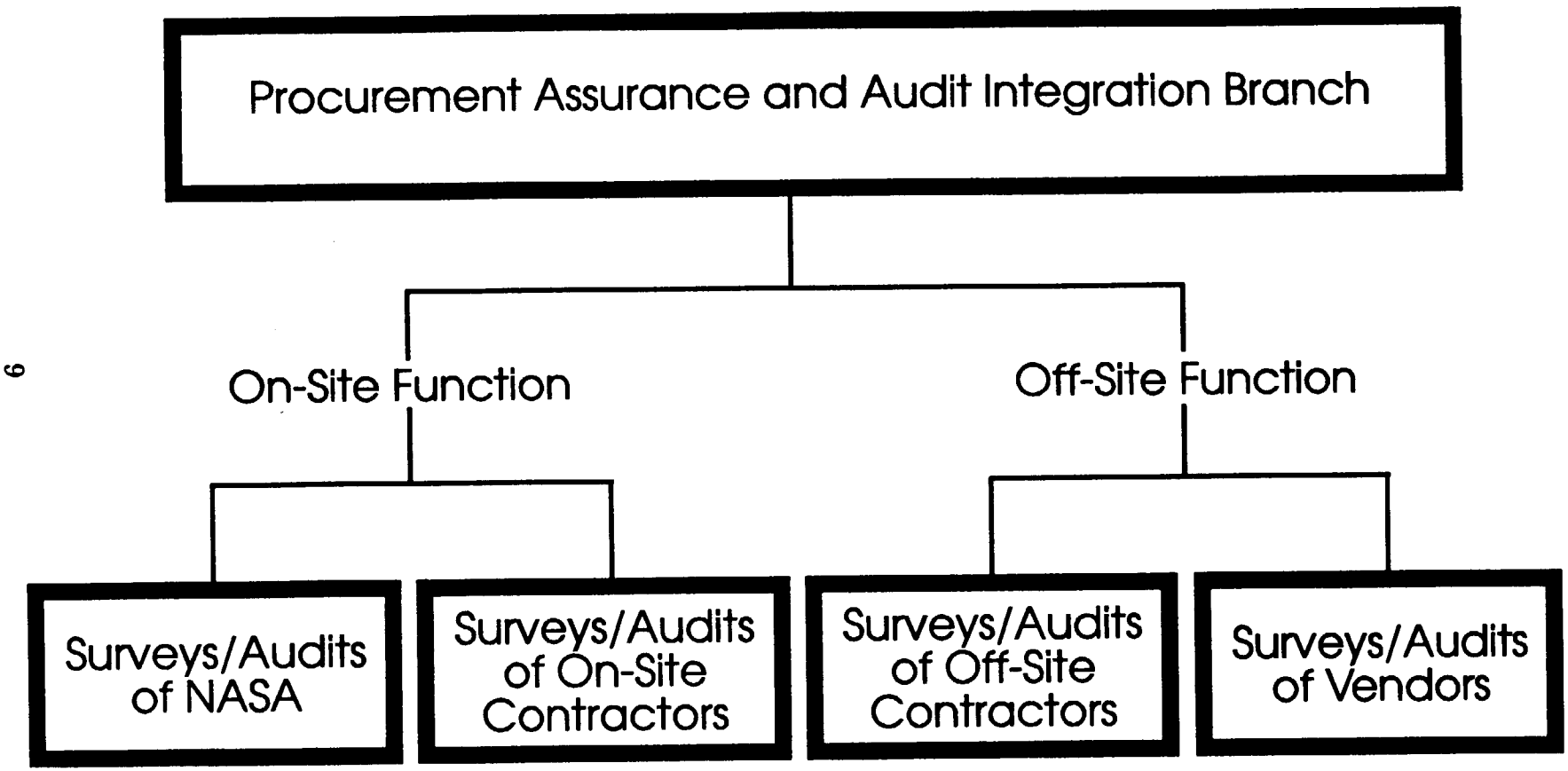


Diagram 1A

KSC Survey/Audit Organizations Contractors

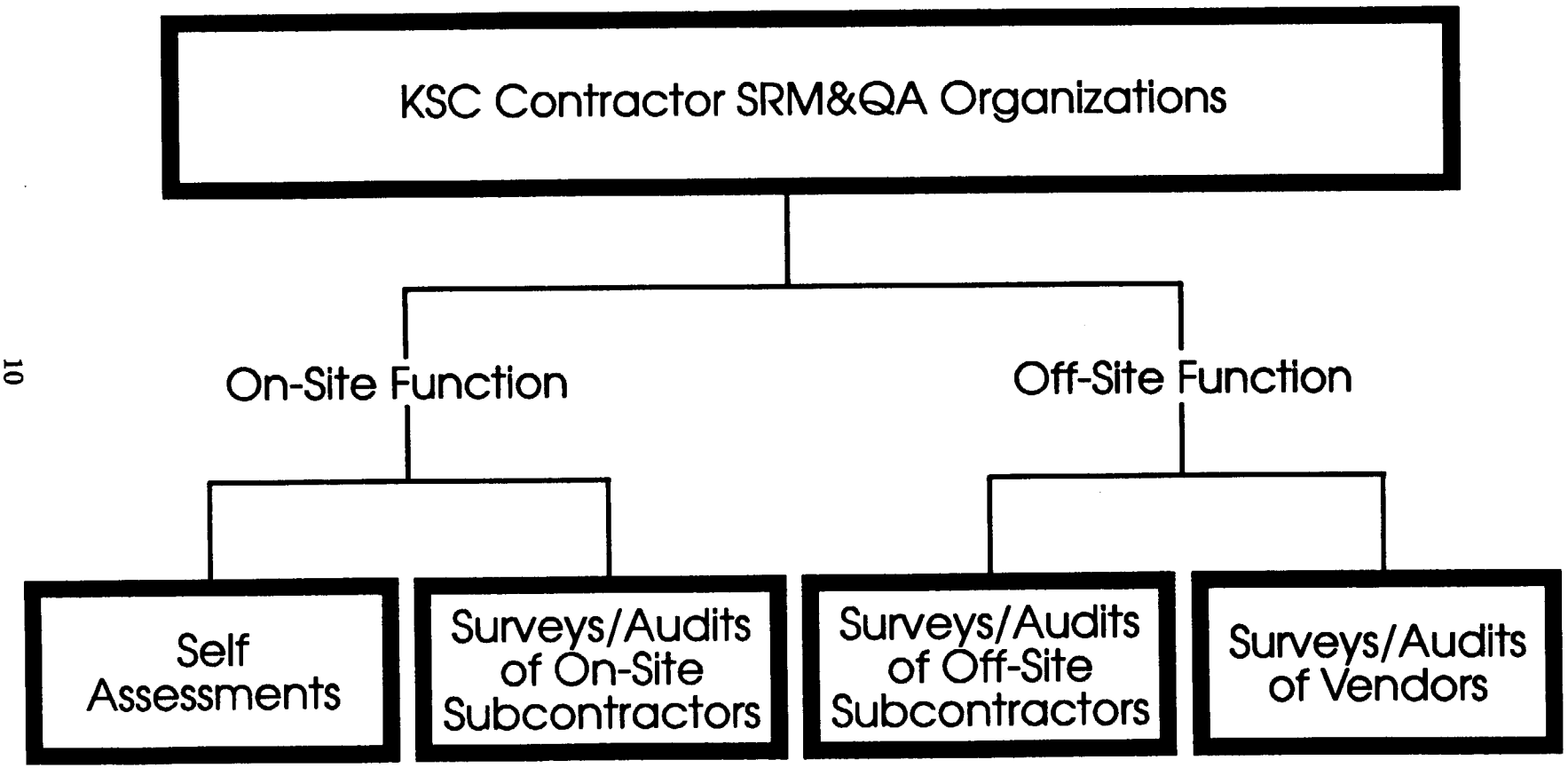


Diagram 1B

RQ Directorate) and KSC on-site contractors, and assessments of capability, compliance, and effectiveness of off-site contractor and vendor operations. KSC contractor organizations are responsible for surveys and audits that provide compliance and assessments of the effectiveness of internal organizations and on-site subcontractors. In addition, KSC contractor organizations are responsible for surveys and audits that provide capabilities, compliance and effectiveness assessments of off-site subcontractor and vendor operations.

3.3.2 Survey and Audit Process

Definitions for a survey and an audit are provided in paragraph 1.4. However, the distinguishing difference is not always clear because of the many different functions being performed that are titled surveys and audits. Regardless of the name of the survey or audit, the end result of the function being performed is to assess capability, compliance, effectiveness, or a combination thereof. Diagram 2 presents the three basic phases common to all surveys and audits: planning, performing, and concluding survey and audit activities. It also depicts the continuous improvement aspect by returning to the planning phase in a closed loop.

A. During the planning phase, survey and audit activities are scheduled, the organizations to be surveyed and audited are officially notified, the conduct of the survey and audit is organized (resulting in a plan of auditor and team assignments and areas to be investigated), and previous audit results, contracts, plans, issuances specifying requirements, and procedures describing processes are reviewed. In addition, the auditors prepare checklists and questions to be asked during interviews and the auditors attend entrance briefings to determine points-of-contact, arrange meetings, and determine facility locations.

B. During the performance phase, the auditors meet with points-of contact and local area management, interview personnel, and examine records in accordance with the checklists. Processes are reviewed and analyzed for potential improvements. The auditors also attend team meetings with personnel from the organization being evaluated to discuss issues. The auditors investigate problems, noncompliances, and process enhancement opportunities and attempt to resolve issues with area management. If unsuccessful, they attempt to resolve issues with the functional managers within the organization

Survey/Audit Process

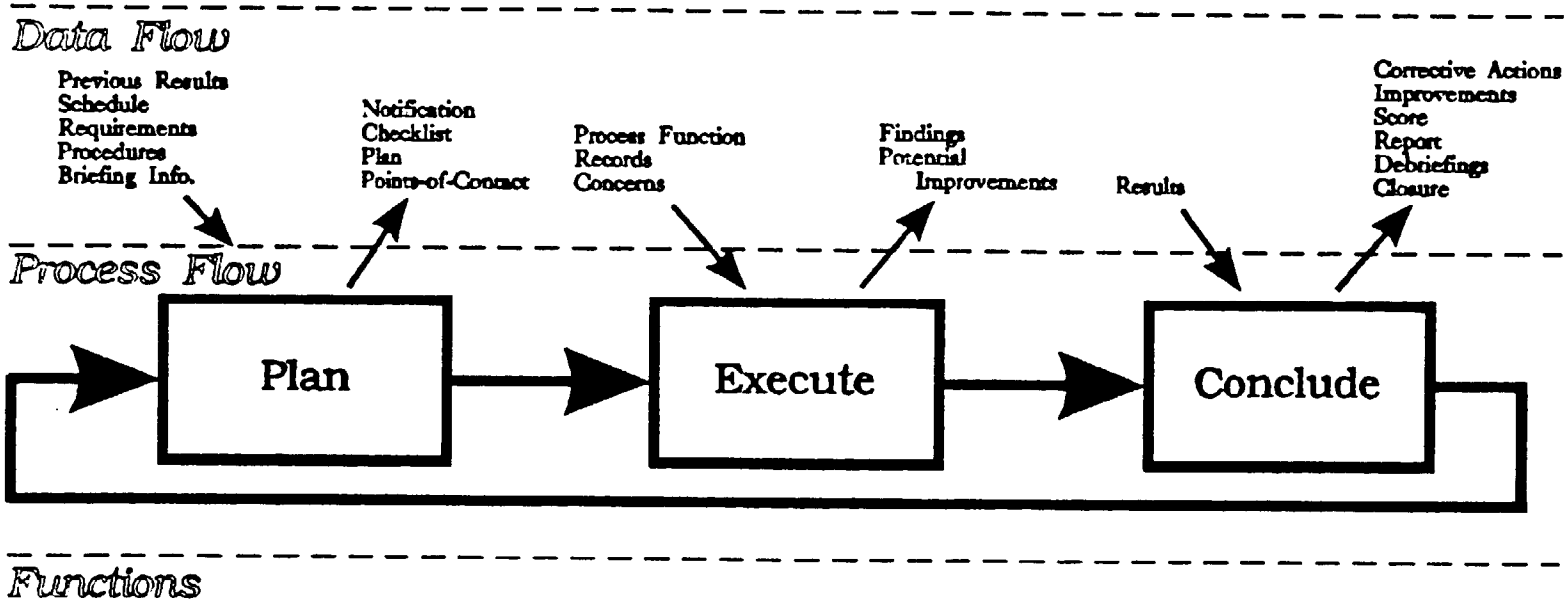


Diagram 2

being evaluated. If still unsuccessful or the value added of a requirement is in question, they attempt to resolve issues with cognizant SR&QA management. Auditors will have unimpeded access to the level of management necessary to resolve an issue. The results are findings and recommendations for improvement.

C. During the concluding phase, the auditors evaluate the results of investigations and, if determined to be value-added, document the findings (nonconformances) with recommendations for corrective action, including those corrective actions significant enough to require statusing until completed. Opportunities for improvement resulting from process evaluations are also developed. Debriefings to upper level management are made (when appropriate) and the final report is prepared and distributed. When the audited organization submits corrective action plans, responses, or status, the auditors evaluate the information, status or close the items, and provide survey and audit closure and followup, as necessary. The survey or audit will normally be closed with the acceptance of a corrective action plan.

3.4 PROGRAM REQUIREMENTS

Paragraph 1.3, APPLICABLE DOCUMENTS, lists issuances that contain the basic NASA and contractor requirements for performing surveys and audits. The following paragraphs supplement these general requirements in order to ensure uniform implementation of the KSC Survey and Audit Program.

3.4.1 Survey and Audit Plans and Procdures

NASA and contractor organizations at KSC performing survey and audit functions shall have a Survey and Audit Program Plan using Appendix A, SURVEY AND AUDIT PLAN GUIDE, and/or procedures sufficient to implement the program. The plan shall define organizational responsibilities as related to survey and audit activities, the approach to be used in implementing the program, a description of the applicable on-site and off-site activities, auditor training and certification, and the intended use of measurements and trending.

3.4.2 Process Evaluations

Process evaluations represent the core enhancement provided by the survey and audit program. A process evaluation consists of a study and examination of the following:

A. The sequential flow of data and material required to produce a service or product.

B. The tasks associated with transforming the data and material into useful information or the constituents of the final product.

C. The functions of personnel involved in the events occurring during the process.

D. The interrelationships of other processes.

E. The requirements and control aspects of the process.

F. The problems, noncompliance issues, and instabilities of the process.

G. The measurements that define the efficiency, effectiveness and acceptability of the process, and process results.

The information obtained during the study and examination is analyzed using techniques, such as, flow diagrams, Pareto charts, cause and effect diagrams, trends of measurement data and problems, and any other tools that will simplify and provide basic understanding. The analysis should be sufficient to permit visibility of the root causes of problems, recognition of potential improvements, and the determination that the process yields the desired results with minimum effort and error.

Survey and Audit Plans and/or procedures shall delineate process evaluations and the methods utilized to provide process improvements and promote first time quality.

3.4.3 Compliance Evaluations

Compliance evaluations are an integral part of the survey and audit program. Determining compliance requires the existence of substantiating evidence. Compliance evaluations consist of a study and interpretation of requirements by the auditor, the selection of criteria that the auditor believes will provide the knowledge necessary

to be able to assert compliance (checklist), interviews with audited personnel, and an examination of records that may be performed by statistical sampling.

The existence of a nonconformance should initiate further investigation. A nonconformance that goes undetected until an audit should inspire questions about the necessity of the requirement, the priority and criticality of the requirement, the resources needed for compliance, and the value that is added to the system or process by requiring compliance.

Survey and Audit Plans and/or procedures shall delineate compliance evaluations and the methods to be utilized in preventing costly and unnecessary reporting of unwarranted nonconformances.

3.4.4 Capabilities Evaluations

Capabilities evaluations routinely constitute the part of the survey and audit program that currently addresses off-site contractors, vendors, and suppliers; however, the on-site survey and audit program may perform a capability evaluation for ongoing or new contractors, as needed. A capabilities evaluation is an assessment of personnel, equipment, facilities, management structure, quality, reliability and maintainability programs and systems, documentation, procedures, material, product, and any other items necessary to perform or produce in accordance with contract requirements. The evaluation results in the determination that a contractor has or does not have the resources and ability to ensure a reasonable probability of successfully completing the contract.

Survey and Audit Plans and/or procedures shall delineate capabilities evaluations and the methods utilized to ensure adequate assessments and accurate determinations.

3.4.5 Scheduling and Results Reporting

The KSC Survey and Audit Program provides sufficient uniformity to permit consolidation of survey and audit schedules and reported results. NASA will be responsible for consolidating this information and providing it to all organizations performing survey and audit activities at KSC. This will provide greater program visibility and encourage coordination resulting in increased efficiency.

Contractor Survey and Audit Plans and/or procedures shall provide for the reporting of survey and audit scheduling and summarized results

with distribution to include NASA. The NASA plan and procedures shall provide for consolidation of survey and audit scheduling and summarized results with distribution to include all KSC organizations performing survey and audit activities.

3.4.6 Training and Certification

Training and certification requirements are identified in Section IV, TRAINING AND CERTIFICATION. Survey and Audit Plans and/or procedures shall indicate auditor training requirements.

3.4.7 Evaluation Procedure and Measurements

The evaluation procedure and measurement requirements are identified in Section V, EVALUATION PROCEDURE AND MEASUREMENTS. Survey and Audit Plans and/or procedures shall identify appropriate measurements and provide methods and procedures for trending, including response actions based on measurement results.

SECTION IV

TRAINING AND CERTIFICATION

4.1 GENERAL

The workforce involved in the survey and audit function needs to have a common understanding of the way Kennedy Space Center (KSC) performs this highly integrated surveillance of SRM&Q and SRM&Q Assurance functions. To ensure that this common understanding is achieved, specific training is necessary. An evaluation of the degree of learning for each training activity must be made as a condition of course completion.

The survey and audit workforce is composed of a cadre of experts in the survey and audit disciplines (Senior Auditors) who are to plan, organize, implement, report, and status survey and audit activities, and subject matter experts (Auditors) who perform survey and audit functions. The inclusion of subject matter experts as ad hoc members of the survey and audit workforce dictates the need for identifying two levels of training. These training requirements are not intended to exclude technical experts, assistants, or auditors in training from participating in a survey or audit, provided they are given guidance by an auditor trained in the manner described herein.

KSC organizations performing survey and audit functions will identify auditor training requirements, courses, methods for providing training, a status and record keeping system, and provisions for auditor certification in their Survey and Audit Plan and/or procedures.

4.2 TRAINING REQUIREMENTS

The training requirements for Auditors and Senior Auditors are described in the following paragraphs.

4.2.1 Auditor

An auditor must be trained in survey and audit preparation techniques, such as, documentation and requirement review, checklists, and analysis of previous survey and audit measurement results. Training will include techniques for interviewing, records examination, investigating, process analysis, and effectiveness measurement interpretation. Training will also provide for post-

survey and audit activities, such as, documenting results and recommendations, evaluating responses, and closing documented items.

4.2.2 Senior Auditor

In addition to the training for an auditor, a Senior Auditor must be trained in planning and organizing surveys and audits, selecting team members, scheduling and chairing briefings and meetings, and resolving conflicts. In addition, Senior Auditor training will provide for the preparation of survey and audit reports, debriefing management, and survey and audit closure.

4.3 TRAINING CRITERIA

The training course content described below represents the minimum criteria suitable for meeting training needs defined by this program initiative. This training is in addition to any training required to perform the technical or administrative part of an individual's task. Should any of these courses overlap other required training, the individual may elect to be evaluated and not take the entire course.

Survey and Audit Preparations: Training associated with presurvey and audit activities including analysis of previous survey and audit measurement results; reviewing requirement documentation; conducting initial interviews with the personnel being audited; determining cognizant points-of-contact; and checklist preparation.

Survey and Audit Techniques: Training associated with the performance of survey and audit activities including interviewing personnel, records examination, investigating problem causes, analyzing processes, measurement techniques, and evaluating the effectiveness of procedures and requirements in obtaining desired objectives.

Postsurvey and Audit Activities: Training associated with postsurvey and audit activities including documenting results, assessing performance measures, making recommendations for process enhancement or corrective action, evaluating responses, and closing documented items.

On-The-Job-Training: Training associated with the actual performance of the activities described above.

Organizing and Leading a Survey or Audit (Senior Auditor Requirement): Training associated with planning, organizing and scheduling surveys and audits including team member selection, chairing briefings and meetings, and resolving conflicts.

Survey and Audit Report Preparation (Senior Auditor Requirement): Training associated with performing postaudit meetings, preparation of executive summaries, survey and audit reports, debriefing management, and closing surveys and audits.

4.4 ACCREDITATION

Candidates having completed the required training, which includes an assessment of learning, will be evaluated and certified by their management. Management should use relevant experience and past performance as demonstrating required skills.

4.5 MAINTENANCE OF ACCREDITATION

Each organization shall address maintenance of accreditation and suspension requirements in their Survey and Audit Plan and/or procedures.

KSC SURVEY AND AUDIT PROGRAM

SECTION V

EVALUATION PROCEDURE AND MEASUREMENTS

5.1 INTRODUCTION

An evaluation procedure and measurement system are required for the survey and audit program. Each will provide information on the performance of the organization or process being surveyed or audited (auditee) and the organization performing the survey or audit. The performance information will be used to decide on appropriate, meaningful recommendations, and assess the impact of previous changes or corrective actions. The evaluation procedure is a structured method of assessing each finding. The measurement system provides metrics which will be used for continuous improvement by both the auditee and the auditing organization. The attributes of performance that must be evaluated are capability, compliance, effectiveness, and corrective action.

Contractor and civil service Survey and Audit Plans and procedures shall describe an evaluation procedure and measurement system to evaluate performance attributes including how data is collected, interpreted, utilized, and reported. The data must provide the means to indicate trends in the auditee's SRM&Q functions and SRM&QA programs.

5.2 SURVEYS

5.2.1 Preaward Surveys

Preaward surveys are performed to evaluate a contractor's, subcontractor's, or vendor's ability to meet requirements prior to contract award.

The preaward survey does not determine compliance since there is no contractual relationship. Therefore, the performance measure is limited to capability. Measurement data for preaward surveys is in the form of "acceptable" (capable) or "unacceptable" (not presently capable). Alternatives to this measurement approach may be proposed for evaluation in each organization's Survey and Audit Plan and/or procedures.

5.2.2 Postaward Surveys

Postaward surveys are performed to evaluate a contractor's, subcontractor's, or vendor's compliance, and may include process evaluations. Performance measurements will be accumulated consistent with SRM&Q functions and SRM&QA requirements. The auditor is required to make value judgments based upon many factors in order to determine the significance of survey findings. The evaluation procedure described in paragraphs 5.4 and 5.5 provides the data necessary for assessing compliance and effectiveness during postaward surveys. Tailoring or departure from this procedure for off-site postaward surveys may be proposed for evaluation in each organization's Survey and Audit Plan and/or procedures.

5.3 AUDITS

5.3.1 Compliance Audits

Compliance audits are assessments, usually involving a checklist, of a contractor's, subcontractor's, or civil service organization's compliance to SRM&Q and SRM&QA requirements. The auditor is required to make value judgments based upon many factors in order to determine the significance of audit findings. The evaluation procedure described in paragraphs 5.4 and 5.5 provides the data necessary for assessing compliance audits.

5.3.2 Process Audits

A process audit is an assessment of procedures, practices, and systems to evaluate the effectiveness of implementation and to identify potential improvements. The auditor is required to make value judgments based on many factors in order to determine the significance of findings. The evaluation procedure described in paragraphs 5.4 and 5.5 provides the data necessary for assessing process audits.

5.4 CONCEPT

Since compliance issues may arise during a process audit and recommendations to improve a process may be made during a compliance audit, an evaluation procedure and measurement system that can accommodate both compliance and process audits is required. The following paragraphs describe a uniform method for evaluating each finding and a basic measurement system that is acceptable for the purpose of providing the measurement results required for the KSC Survey and Audit Program.

5.4.1 Measurement Introduction

The results from a survey or audit are findings of: (1) Nonconformances requiring corrective action; (2) Observations with recommendations for improvement; (3) Verifications of compliance to requirements; and (4) Commendations recognizing outstanding performance. The input to the measurement system is the data collected through the evaluation procedure. The output of the measurement system must be information that can be used to judge success. To accomplish this, the information must quantify compliance, effectiveness, and corrective action. The function of the measurement system is to translate findings into measures of the attributes of performance.

5.4.2 Common Characteristics of Findings

The first step in the evaluation is to identify common characteristics of findings that provide information about the significance of a problem or enhancement as related to what is affected and to what degree, the magnitude as related to how often it occurs, and the impact as related to the effect or result of taking corrective action. The categorization of information about each finding can then be defined as Importance, Character, Frequency, and Impact.

5.4.3 Establishing Levels of Significance

The next step is to provide for levels of the finding characteristics identified above. "Importance" ranges from critical to minor and is defined as: (1) Critical - effecting the safety of personnel or the condition of flight hardware; (2) Mission - having the potential to effect mission success; (3) Economic - regarding waste or cost; and (4) Minor - indicative of attention to detail and first time quality. "Character" ranges from systemic to random and is defined as: (1) Systemic - inherent in systems that define and implement SRM&Q functions or SRM&QA programs; (2) Organizational - limited to function groups; (3) Area - relating to a particular location or facility; and (4) Random - meaning isolated and probably unrelated. "Frequency" ranges from all the time to infrequently and is defined as: (1) Always, (2) Usually, (3) Sometimes, and (4) Rarely. "Impact" is defined as: (1) Essential to maintaining, enhancing, and ensuring safety; (2) Required for improving first time quality; (3) Desirable for improving product quality and outgoing quality; and (4) Undesirable addition of cost. These levels are depicted in Diagram 3. The Importance

Levels of Finding Characteristics

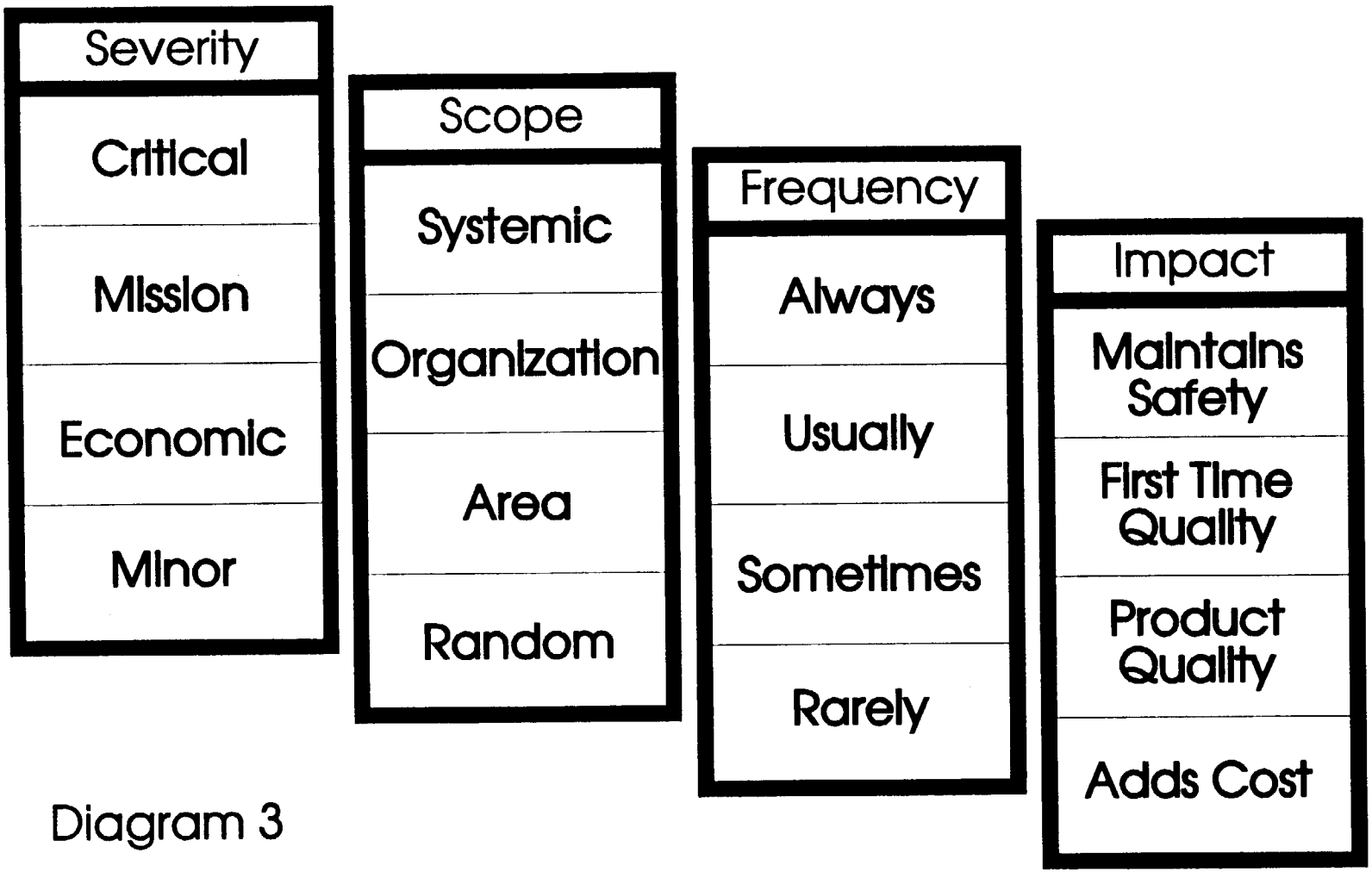


Diagram 3

of a finding is summarized with all other findings of a similar level of Importance. The same is accomplished for Character, Frequency, and Impact of the findings. The total of each column should be equal.

5.4.4 Data Organization

The last step is to recognize that the performance attributes are associated with different types of findings. This requires that levels of the characteristics for Nonconformances, Verifications, Observations, and Commendations be accumulated separately.

5.4.5 Acceptability of Recommendations

When documenting Observations, the auditing organization provides recommendations for improvements. The audited organization responds to the acceptability of the recommendations in a corrective action plan. This information is used in measuring the effectiveness of the auditing organization.

5.4.6 Corrective Action Performance

Since audits may be closed based on the auditee's corrective action plan, a measurement is necessary to assess the auditee's progress. Data on the number of commitments achieved out of the total due will be used for this measurement. This measurement may be performed at a major milestone identified in the plan or at the estimated completion date.

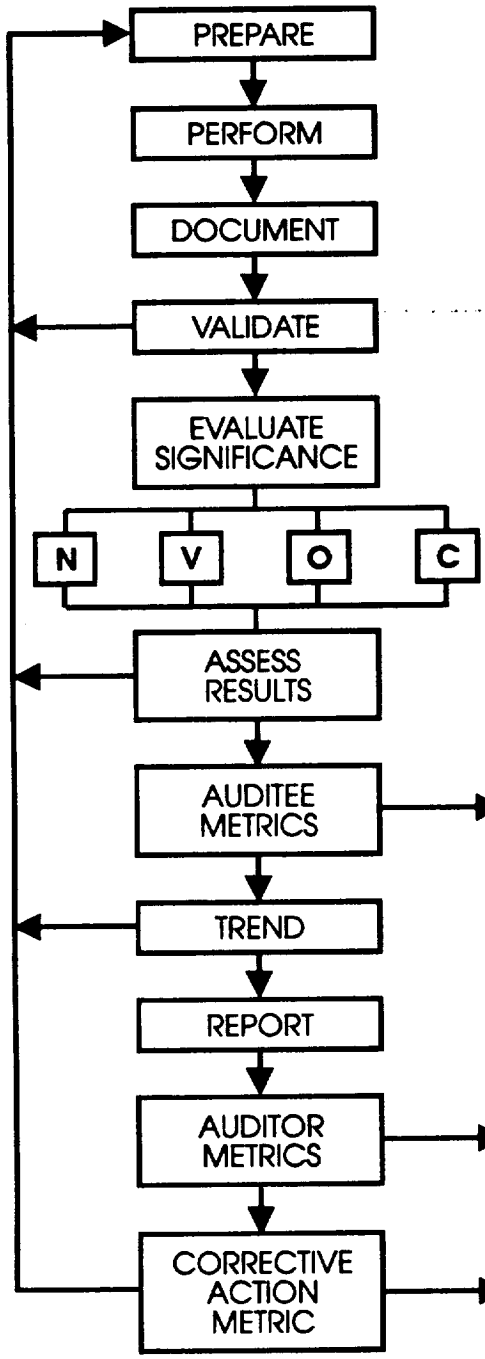
5.5 EVALUATION PROCEDURE

This procedure and the measurement system outlined in paragraph 5.6 will provide information on the performance of the organization or process being surveyed or audited (auditee) and the organization conducting the survey or audit. Analysis of the metrics will allow for continuous improvement by both the auditee and the auditing organization. The procedure and measurement sequence is identified in Diagram 4 and delineated in the paragraphs below.

5.5.1 Prepare

The evaluation procedure must begin with the development of checklists and a review of documentation describing the process being audited. The auditor must use this information and measurement results from previous surveys and audits to ensure that the eventual results of the survey or audit contain a sufficient number of significant

Procedure with Metrics



(Paragraph 5.5.1)

(Paragraph 5.5.2)

(Paragraph 5.5.3)

(Paragraph 5.5.4)

(Paragraph 5.5.5)

(Paragraph 5.6.1)

(Paragraph 5.6.2)

Auditee Compliance

(Paragraph 5.6.4)

(Paragraph 5.6.5)

Auditing Organization Effectiveness

Corrective Action Effectiveness

Diagram 4

items to provide a comprehensive and credible examination that will yield adequate data for measurement indicators. To avoid the anomalies associated with small sample sizes, the number of significant items in the audit plan should be greater than 35. Audits that have fewer than 35 must contain information necessary to justify the deviation. When preparing for a process audit, the inputs and outputs of each step in the process must be determined and evaluated.

5.5.2 Perform

The auditor should endeavor to obtain necessary information in the least intrusive and disruptive manner possible. Complete information is necessary to ensure the accuracy of the metrics and this requires auditee cooperation. The auditor should not rely solely on a checklist or adhere to predetermined items when more potentially valuable or significant information arises (unless continuity is important). In addition, the auditor should always provide the auditee with an opportunity to identify successes and implemented improvements or enhancements which may be documented as Commendations.

In addition, sampling should be utilized whenever possible to simplify the audit process and provide meaningful data for measurement. Inspecting a large number of items to produce a small number of nonconformances could skew the measurement data.

5.5.3 Document

The auditor should document findings as indicated in Diagram 5. Outstanding process effectiveness is documented as a Commendation. Areas needing improvement are documented as Observations. Process ineffectiveness determined to be the result of a lack of adherence to requirements is a noncompliance issue and should be documented as a Nonconformance.

Outstanding methods of compliance should be identified in a Commendation. Verifications are used to record acceptable (Good) compliance and Nonconformances are used to record unacceptable (Bad) noncompliance.

Nonconformances should not be used to document a remedial action necessary to correct a discrepancy. Discrepancies do not provide adequate or useful information for trending purposes. Nonconformances must identify a correctable problem and the cause. In addition, a judgment of the value added by a requirement should be made. Compliance to a requirement that does not add value is "Not

Documenting Findings

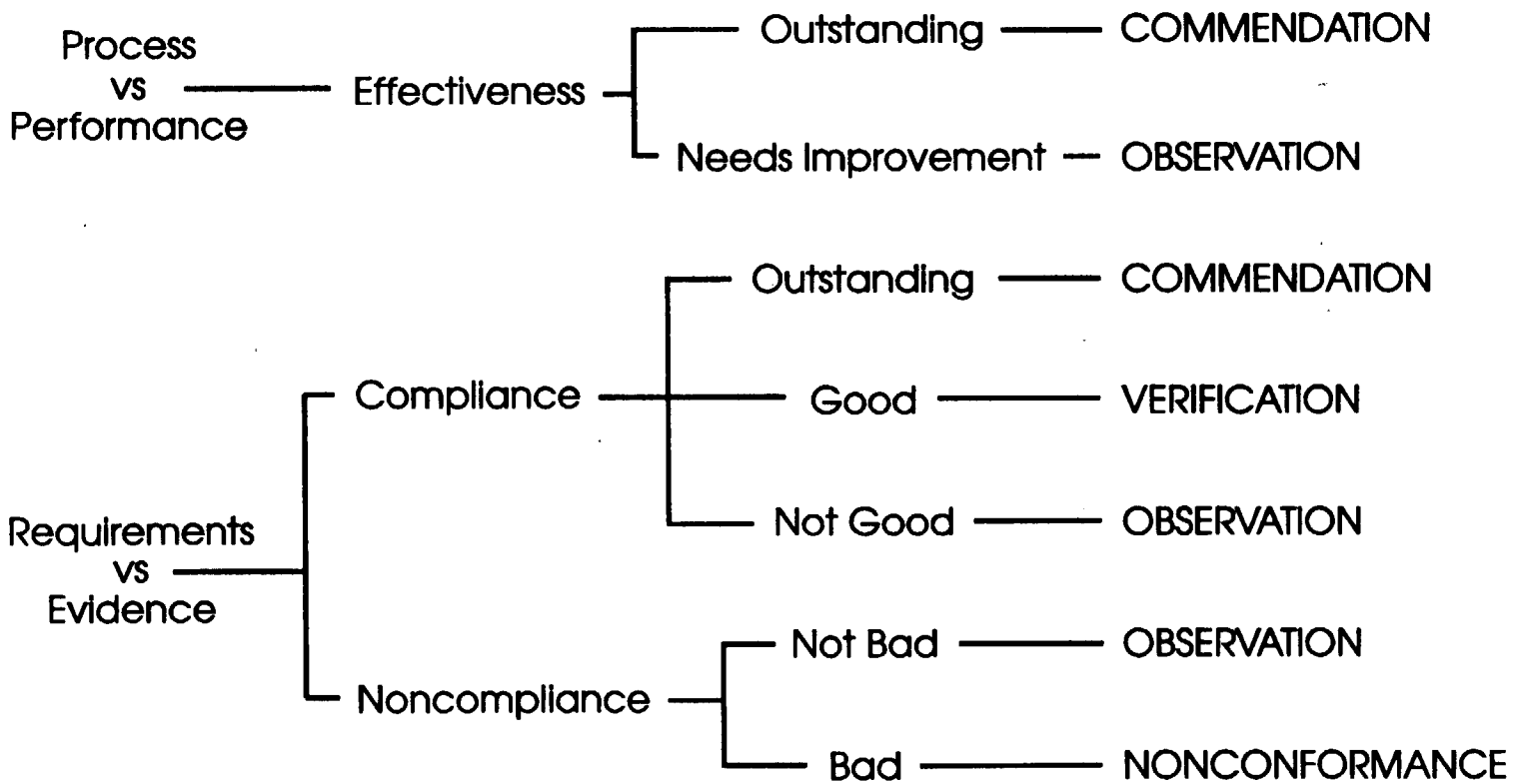


Diagram 5

Good" and should be identified in an Observation. Further, noncompliance with a requirement that does not add value is "Not Bad" and should also be identified in an Observation.

5.5.4 Validate

The auditor should validate requirements by ensuring that they are necessary to achieve the desired result of the process. Questions concerning the accuracy or necessity of requirements should be resolved through discussions with local area management, auditee functional management, or cognizant SR&QA management. The results of the discussions may require further investigation. Auditing organization metrics described in paragraph 5.6.6 will reflect the success of this task.

5.5.5 Evaluate Significance

The levels of significance are ranked from top to bottom in each of the four characteristics (Diagram 3), with the highest significance at the top. When evaluating the significance of a finding (Nonconformance, Verification, Observation or Commendation), use good judgment and all available information that pertains to a reasonable probability of occurrence or effect, not remote possibility. Start with the first characteristic (Importance) and the most significant level (Critical) and decide if the importance of the finding is considered critical. If not Critical, refer to the next lower level (Mission) and decide if the importance is considered mission related. If not Mission, continue to move down, using the lowest level whenever the higher levels are not appropriate. Next move to the second characteristic (Character) and perform a "top-down" analysis. Continue the process for all four characteristics.

The following paragraphs are intended to provide a brief description of the evaluation of findings.

A. Importance - When determining the Importance of a finding, if it isn't obviously Critical, Mission related, or it doesn't involve significant Economic value, it's Minor. This raises the most important findings to a high level of visibility. Critical and Mission related findings are candidates for immediate action. Findings of an Economic value should be judged to be more significant than the average Minor.

B. Character - When determining the finding's Character, Systemic should be used to identify problems with contract requirements,

quality plans, procedures, and any directive that causes the wrong thing to be done. Discipline problems are generally Organizational in Character, even if they appear randomly. Findings that record facility conditions, or are only meaningful when considering the location, should be summed as Area. If the finding's Character cannot be determined to be Systemic, Organization, or Area, it should be summed as Random.

C. Frequency - The Frequency of a condition or occurrence reported in a finding should be determined as Always, Usually, Sometimes, or Rarely. For example, if the finding identifies a safety hazard that is part of the building, it is Always present. If the hazard exists when a particular machine is in use or only during a specific operation, it is present Sometimes.

D. Impact - The value of Impact should reflect the effect of taking corrective action or implementing a recommendation. Problems that effect Safety have the highest priority.

5.6 MEASUREMENT SYSTEM

In order to measure the performance of the auditee and the auditing organization, certain standard measurements are required. These measurements are formulated by utilizing the evaluation data obtained from the above procedure.

5.6.1 Sum Evaluation Data

When summing the evaluation data, Nonconformances, Verifications, Observations, and Commendations are accumulated separately. Count the total number of Nonconformances that had the Importance characteristic judged to be Critical and record as NC. Perform a similar count for Mission (NM), and Economic (NE). Perform the same process for Verifications, Observations, and Commendations, respectively. These sums will be used during the calculation of the auditee metrics. Summations of the Impact characteristic are used for metrics of the auditing organization.

Some organizations may find it desirable to place weighted values to each of the attributes in Diagram 3. Weighting the attributes is optional and may provide additional emphasis where deemed necessary. A specific method of weighting is beyond the scope of this document.

5.6.2 Assess Results

Generally, measures are intended to provide information regarding the appropriateness of previous corrective actions. As such, interpretation requires a comparison of the present data to previous data. However, an analysis of the present data from this measurement system can yield immediate information regarding the health and status of the auditee. The valuations of Importance, Character, Frequency, and Impact are ordered in significance from top to bottom. An initial look at the valuations of the Nonconformances and Observations will identify the need for immediate concern, the degree of concern, and the potential for realization of the concern.

As with any measurement system, accuracy will increase with more samples. Care must be taken to avoid judgments based on insufficient data. It may be necessary to perform further investigations. To avoid the anomalies associated with small sample sizes, the number of significant items in the audit plan should be greater than 35. Audits that have fewer than 35 must contain information necessary to justify the deviation.

5.6.3 Auditee Metrics

To facilitate continuous improvement, metrics are required to assess the auditee. The data for the metrics is derived from the summations of finding evaluations performed in paragraph 5.6.1. The metrics described below relate the Importance of survey and audit findings to the compliance of the auditee. When applying metrics to the results of a process audit, the auditee is the process.

The values obtained from the metrics for any particular audit are not intended to indicate a good or bad level of performance. The utility of the metrics is in providing a value benchmark to determine if improvement has occurred. A comparison can be made between successive audits or between periods of time because the data is relational and may be summed over several audits. The data can also be subdivided to provide values for metrics that have a Systemic or Organizational character.

A. Critical Compliance

The purpose of this metric is to measure the auditee's effectiveness in complying with requirements having critical significance. If an audit does not include a review of critical

requirements, the critical effectiveness measure is "Not Applicable." This metric is calculated as follows:

$$CE = CP/FC = CP/(CP + NC)$$

WHERE CE IS THE CRITICAL EFFECTIVENESS MEASURE,

FC IS THE NUMBER OF COMPLIANCE FINDINGS OR TOTAL FINDINGS LESS OBSERVATIONS,

CP IS CRITICAL PERFORMANCE (THE NUMBER OF COMPLIANCE FINDINGS EXCLUDING NONCONFORMANCES IDENTIFIED AS CRITICAL), OR *FC LESS NC (CP = FC - NC)*, AND

NC IS THE NUMBER OF NONCONFORMANCES IDENTIFIED AS CRITICAL.

NOTE: AS NC IMPROVES TOWARD ZERO, CE WILL APPROACH ONE.

B. Mission Compliance

The purpose of this metric is to measure the auditee's effectiveness in complying with requirements having mission significance. If an audit does not include a review of mission requirements, the mission effectiveness measure is "Not Applicable." This metric is calculated as follows:

$$ME = MP/FC = MP/(MP + NM)$$

WHERE ME IS THE MISSION EFFECTIVENESS MEASURE,

FC IS THE NUMBER OF COMPLIANCE FINDINGS OR TOTAL FINDINGS LESS OBSERVATIONS,

MP IS MISSION PERFORMANCE (THE NUMBER OF COMPLIANCE FINDINGS EXCLUDING NONCONFORMANCES IDENTIFIED AS MISSION), OR *FC LESS NM (MP = FC - NM)*, AND

NM IS THE NUMBER OF NONCONFORMANCES IDENTIFIED AS MISSION.

NOTE: AS NM IMPROVES TOWARD ZERO, ME WILL APPROACH ONE.

C. Economic Compliance

The purpose of this metric is to measure the auditee's effectiveness in complying with requirements having economic significance. If an audit does not include a review of economic requirements, the economic effectiveness measure is "Not Applicable." This metric is calculated as follows:

$$EE = EP/FC = EP/(EP + NE)$$

WHERE **EE** IS THE ECONOMIC EFFECTIVENESS MEASURE,

FC IS THE NUMBER OF COMPLIANCE FINDINGS OR TOTAL FINDINGS LESS OBSERVATIONS,

EP IS ECONOMIC PERFORMANCE (THE NUMBER OF COMPLIANCE FINDINGS EXCLUDING NONCONFORMANCES IDENTIFIED AS ECONOMIC), OR ***FC LESS NE (EP = FC - NE)***, AND

NE IS THE NUMBER OF NONCONFORMANCES IDENTIFIED AS ECONOMIC.

NOTE: AS NE IMPROVES TOWARD ZERO, EE WILL APPROACH ONE.

D. Overall Compliance

The purpose of this metric is to measure the auditee's overall compliance. This metric is calculated as follows:

$$OC = TVC/FC = TVC/(TVC + NT)$$

WHERE **OC** IS THE OVERALL COMPLIANCE OF THE AUDITEE,

FC IS THE NUMBER OF COMPLIANCE FINDINGS OR TOTAL FINDINGS LESS OBSERVATIONS,

TVC IS THE TOTAL NUMBER OF VERIFICATIONS AND COMMENDATIONS, AND

NT IS THE TOTAL NUMBER OF NONCONFORMANCES.

Note: As NT improves toward zero, OC will approach one.

The auditee metrics provide management with an indication of the level of compliance pertaining to critical responsibilities, mission-related activities, and economy of operations. These metrics, along with overall compliance, will be used to determine if the systems and processes being audited are benefiting from the survey or audit process. A decrease in the mission or economic compliance metric from one audit to the next will alert management to the potential need for action through training, increased discipline, additional special audits, or other emphasis methods, as appropriate. A decrease in the critical or overall compliance metric from one audit to the next or an exceptionally low value during an initial bench marking audit will indicate the need for management attention at the highest level. An increase in overall compliance in the absence of any specific critical or mission-related problems may allow the auditing organization to justify less frequent audits, thereby maximizing the utilization of resources.

5.6.4 Trend

Survey and audit metrics shall be trended to exhibit and demonstrate any tendencies revealed by successive evaluations of similar characteristics. The results of this analysis may require further investigation into selected areas.

5.6.5 Report

The auditor should prepare reports in a concise manner. Recommendations for corrective action and improvement must be explicit. It is advisable to justify recommendations by indicating appropriate metrics and identifying the results of applicable discussions with management. Judgments may be substantiated with trend data.

5.6.6 Auditing Organization Metrics

To facilitate continuous improvement, metrics are required to assess the survey and audit organization effectiveness. The data for the metrics is derived from the summations of finding evaluations performed in paragraph 5.6.1. The survey and audit organization's effectiveness in achieving the desired impact is related to the success in making recommendations that are acceptable to the auditee. It will be necessary to review the auditee's corrective action plan to determine implemented recommendations.

A. Safety

The purpose of the safety metric is to measure the auditing organization's effectiveness in influencing areas that impact safety. The safety metric is calculated as follows:

$$SE = OSA/(OSA + OSN)$$

WHERE SE IS THE EFFECTIVENESS MEASURE OF THE AUDITING ORGANIZATION INVOLVING SAFETY,

OSA IS THE NUMBER OF OBSERVATIONS IDENTIFIED AS AN IMPACT TO SAFETY WHERE THE AUDITOR RECOMMENDATION WAS ACCEPTED BY THE AUDITEE, AND

OSN IS THE NUMBER OF OBSERVATIONS IDENTIFIED AS AN IMPACT TO SAFETY WHERE THE AUDITOR RECOMMENDATION WAS NOT ACCEPTED BY THE AUDITEE.

NOTE: AS OSN IMPROVES TOWARD ZERO, SE WILL APPROACH ONE.

B. First Time Quality

The purpose of the first time quality metric is to measure the auditing organization's effectiveness in influencing the occurrence of first time quality. The metric is calculated as follows:

$$FTQE = OFA/(OFA + OFN)$$

WHERE FTQE IS THE EFFECTIVENESS MEASURE OF THE AUDITING ORGANIZATION INVOLVING FIRST TIME QUALITY,

OFA IS THE NUMBER OF OBSERVATIONS IDENTIFIED AS AN IMPACT TO FIRST TIME QUALITY WHERE THE AUDITOR RECOMMENDATION WAS ACCEPTED BY THE AUDITEE, AND

OFN IS THE NUMBER OF OBSERVATIONS IDENTIFIED AS AN IMPACT TO FIRST TIME QUALITY WHERE

THE AUDITOR RECOMMENDATION WAS NOT ACCEPTED BY THE AUDITEE.

NOTE: AS OFN IMPROVES TOWARD ZERO, FTQE WILL APPROACH ONE.

C. Product Quality

The purpose of the product quality metric is to measure the auditing organization's effectiveness in influencing improved product quality. The metric is calculated as follows:

PQE = OPA/(OPA + OPN)

WHERE **PQE** IS THE **E**FFECTIVENESS MEASURE OF THE AUDITING ORGANIZATION INVOLVING **P**RODUCT **Q**UALITY,

OPA IS THE NUMBER OF **O**BSERVATIONS IDENTIFIED AS AN IMPACT TO **P**RODUCT **Q**UALITY WHERE THE AUDITOR RECOMMENDATION WAS ACCEPTED BY THE AUDITEE, AND

OPN IS THE NUMBER OF **O**BSERVATIONS IDENTIFIED AS AN IMPACT TO **P**RODUCT **Q**UALITY WHERE THE AUDITOR RECOMMENDATION WAS NOT ACCEPTED BY THE AUDITEE.

NOTE: AS OPN IMPROVES TOWARD ZERO, PQE WILL APPROACH ONE.

D. Overall Effectiveness

The purpose of this metric is to measure the auditing organization's overall effectiveness. The metric is calculated as follows:

OE = OOA/(OOA + OON)

WHERE **OE** IS THE **O**VERALL **E**FFECTIVENESS MEASURE OF THE AUDITING ORGANIZATION,

OOA IS THE TOTAL NUMBER OF **O**BSERVATIONS WHERE THE AUDITOR RECOMMENDATION WAS ACCEPTED BY THE AUDITEE, AND

OON IS THE TOTAL NUMBER OF OBSERVATIONS WHERE THE AUDITOR RECOMMENDATION WAS NOT ACCEPTED BY THE AUDITEE.

NOTE: AS OON IMPROVES TOWARD ZERO, OE WILL APPROACH ONE.

The auditing organization metrics provide management with an indication of the effectiveness of personnel in adding value to systems through audit, especially in the areas of safety, first time quality and overall product quality. The metrics should be accumulated for a period of time, i.e., calendar year, fiscal year, or performance period. Trends that exhibit deviations from a measure of one alert management to the need for additional training or increased emphasis in these areas. The Overall Effectiveness metric includes all of the above and those Observations impacting cost. Trends that exhibit deviations from a measure of one indicate that auditors are not communicating properly will all levels of cognizant personnel when making recommendations for improvement. This may be caused by inadequate auditor training or insufficient duration of the audit.

5.6.7 Corrective Action Metrics

Auditees are required to submit a Corrective Action Plan in response to the survey and audit report. The plan identifies corrective actions and improvements that the auditee intends to perform. Each commitment requires an estimated completion date. The auditing organization is responsible for evaluating and concurring in the Corrective Action Plan and any subsequent revisions.

A. Corrective Action Effectiveness

The purpose of the corrective action effectiveness metric is to measure the auditee's effectiveness in accomplishing planned corrective actions and improvements. The corrective action effectiveness metric is calculated as follows:

RE = COMPLETED/PLANNED

WHERE RE IS THE CORRECTIVE ACTION EFFECTIVENESS, "COMPLETED" IS THE

NUMBER OF COMMITMENTS ACHIEVED, AND "PLANNED" IS THE NUMBER OF COMMITMENTS SCHEDULED.

Corrective Action Effectiveness (RE) can be calculated at major milestones or at the estimated completion of the plan.

B. Corrective Action Timeliness

The purpose of the corrective action timeliness metric is to measure corrective actions as originally scheduled and identified in the auditee's corrective action plan.

RT = COMPLETED ON SCHEDULE/PLANNED

WHERE RT IS THE CORRECTIVE ACTION TIMELINESS, "COMPLETED ON SCHEDULE" IS THE NUMBER OF COMMITMENTS ACHIEVED ON TIME, AND "PLANNED" IS THE NUMBER OF COMMITMENTS SCHEDULED.

The Corrective Action Effectiveness metric provides management with an indication of completed work. Until this metric equals one, resources are required to complete proposed actions. If the metric does not indicate a continuous approach toward one, the auditing organization will be alerted to a lack of progress and may find it necessary to bring the condition to the attention of the auditee's management. The Corrective Action Timeliness metric provides management with an indication of how adequately the resources are meeting commitments. If a growing difference is noted between RE and RT, the auditee will be alerted to the development of scheduling problems.

5.7 DATA REQUIREMENTS

Each organization shall develop their own procedure on how to integrate the collection of required data. Data collection shall be consistent with the requirement to provide periodic computation of measures and reporting. All data that is collected as part of the required indicators shall be available for both in-house and NASA audit or review.

KSC SURVEY AND AUDIT PROGRAM

SECTION VI

NASA RESPONSIBILITIES

6.1 GENERAL

The responsibilities for assessing conformance to SRM&Q and SRM&Q Assurance (SRM&QA) requirements are shared between the Primary Organizations, Project Managers, and the SR&QA Organization. In general, Primary Organizations are responsible for SRM&Q within their organization, as well as, providing for SRM&Q and SRM&QA within contractor organizations under their management. In addition, Primary Organizations, Project Managers are responsible for self-assessment activities and supporting the SR&QA Organization, which includes furnishing auditors, or subject matter experts as team members to participate in SRM&Q and SRM&QA independent assessments. The SR&QA Organization is responsible for providing SRM&Q and SRM&QA support to Primary Organizations, Project Managers, oversight of self-assessment activities, as well as, providing leadership and integration of independent assessments of SRM&Q and SRM&QA implementation effectiveness through survey and audit activities.

6.2 PRIMARY ORGANIZATIONS AND PROJECT MANAGERS

Primary Organizations and Project Managers are responsible for:

A. Performing activities within their organization and within contractor organizations under their management in accordance with safety, reliability, maintainability and quality requirements.

B. Providing resources for contractor SRM&QA activities, including the training necessary to implement a process oriented survey and audit program.

C. Designating the SR&QA Organization as the SRM&QA management representative for contracts under their management.

D. Supporting the SR&QA Organization survey and audit function with subject matter experts trained and certified in accordance with the requirements of this plan.

E. Performing SRM&Q self-assessments to determine conformance to SRM&Q requirements and the attainment of first time quality in these disciplines.

F. Supporting SRM&QA surveys and audits of their organization and contractor organizations under their management.

G. Concurring with the findings of independent assessments, preparing corrective action plans, and implementing corrective actions.

H. Reporting status of corrective actions significant enough to warrant tracking by the SR&QA Organization.

I. Reporting to the Center Director and to the Director of Safety, Reliability and Quality Assurance areas of SRM&QA nonconformance, which their organization need not be required to meet, along with the rationale for departure from the requirement.

6.3 SR&QA ORGANIZATION

The SR&QA Organization is responsible for:

A. Establishing and interpreting SRM&Q policy, requirements, assurance activities, and supporting Primary Organizations and Project Managers in implementing SRM&Q within their organization and within contractor organizations under their management.

B. Establishing and implementing an SRM&QA independent assessment of NASA-KSC peer organizations and their contractor SRM&Q activities through inspection, surveillance, and surveys and audits of processes and products.

C. Performing SRM&QA self-assessments to determine conformance to SRM&QA requirements and the attainment of first time quality in these disciplines.

D. Providing integration and leadership for the survey and audit function through a cadre of experts (Senior Auditors) in management and operation of the survey and audit function. This cadre will also provide oversight of self-assessments of NASA-KSC and contractors.

E. Supporting the Survey and Audit organization with SRM&Q subject matter experts who are trained and certified in accordance with the requirements of this plan. These subject matter experts (Auditors) will participate in surveys and audits to augment Senior Auditors. During

the course of an audit, the auditor is dedicated full time to the performance of the survey and audit function.

F. Provide interface and liaison (representing KSC) for problem resolution and requirement determinations with peer Centers, NASA Program Managers, and NASA Headquarters in the area of SRM&Q and SRM&QA surveys and audits.

6.3.1 SRM&Q Engineering Organizations

The SRM&Q Engineering Organizations are responsible for:

A. Performing SRM&Q self-assessments to determine conformance to SRM&Q requirements and the attainment of first time quality in these disciplines.

B. Supporting the Survey and Audit Organization with SRM&Q subject matter experts trained and certified in accordance with the requirements of this plan. These subject matter experts (Auditors) will participate in surveys and audits to augment Senior Auditors and are responsible for providing determinations of the significance and value added of findings within the area of their expertise. During the course of an audit, the auditor is dedicated full time to the performance of the survey and audit function. Departures from this requirement will be at the discretion of the Senior Auditor.

C. Reporting to the Director of Safety, Reliability and Quality Assurance areas of SRM&QA nonconformance, which their organization need not be required to meet, along with rationale for departure from the requirement.

D. Determining corrective actions significant enough to warrant statusing by the survey and audit function.

E. Evaluating the performance of the survey and audit function.

6.3.2 Quality Assurance Organization

The Quality Assurance Organization is responsible for:

A. Performing SRM&QA self-assessments to determine conformance to SRM&QA requirements and the attainment of first time quality in these disciplines.

B. Supporting the Survey and Audit organization with Quality Assurance subject matter experts who are trained and certified in accordance with the requirements of this plan. These subject matter experts (Auditors) will participate in surveys and audits to augment the Senior Auditors. The auditors are responsible for providing requirement adequacy determinations and the value added of findings within the area of their expertise. During the course of an audit, the Auditor is dedicated full time to the performance of the survey and audit function. Departures from this requirement will be at the discretion of the Senior Auditor.

C. Concurring with the findings of independent assessments, preparing corrective action plans, and implementing corrective actions.

D. Reporting to the Director of Safety, Reliability and Quality Assurance those areas of Quality Assurance nonconformance, which the organization need not be required to meet, along with rationale for departure from the requirement.

E. Evaluating the performance of the survey and audit function.

F. Determining corrective actions significant enough to warrant statusing by the survey and audit function.

6.3.3 Survey and Audit Organization

The Survey and Audit Organization is responsible for:

A. Providing oversight of NASA-KSC and contractor self-assessment activities.

B. Providing leadership and integration of surveys and audits of NASA-KSC organizations, processes, and products in the area of SRM&Q implementation.

C. Providing leadership and integration of surveys and audits of contractor project management, engineering, and operational organizations in the implementation of SRM&Q requirements.

D. Providing leadership and integration of surveys and audits of contractor SRM&QA capability, implementation, and effectiveness.

E. Escalating residual issues for resolution.

F. Statusing corrective actions significant enough to warrant such action.

G. Consolidating schedules and completions of KSC surveys and audits.

KSC SURVEY AND AUDIT PROGRAM

SECTION VII

PROGRAM REPORTS

7.1 GENERAL

To facilitate continuous improvement, periodic reports shall be required by both NASA and contractor organizations performing surveys and audits.

7.2 PROGRAM REPORTS

In conjunction with unifying the Kennedy Space Center's survey and audit community, each contractor shall make the following inputs to the NASA survey and audit organization:

A. Schedule/Activity: All activity planned for the next 6 months and actual activity for the previous 3 months shall be reported quarterly (NASA fiscal year).

B. Reports: Copies of all survey and audit reports.

C. Measures: Survey and Audit effectiveness measurements and trends, identified in Section V, shall be reported quarterly (NASA fiscal year).

D. Summaries: Survey and Audit summaries shall be submitted semi-annually unless contractually required otherwise.

KSC SURVEY AND AUDIT PROGRAM

APPENDIX A

SURVEY AND AUDIT PLAN GUIDE

The survey and audit program is a program focused primarily on the evaluation of the conformance and effectiveness of processes.

3.2.1 What is Expected

Implementation of a process oriented survey and audit program which establishes a closed loop system for continual improvement. Judgments of the significance of compliance findings shall be made by the survey and audit teams subject matter experts before the findings are formalized.

3.2.2 Value Added

(Only value added findings will be documented. The program will measure its performance through increases in first time quality of process improvements initiated as a result of recommendations.)

3.2.3 Principles

(This program is based on the principle that surveys and audits exist to provide an independent assessment of conformance, worth of conformance, and identification of improvement opportunities.)

3.2.4 Implementation

(Implementation shall be described through procedures. The plan shall include internal and external survey and audit functions covering design, engineering, procurement, as well as, operation and maintenance activities.)

3.3 ON-SITE ACTIVITIES

(Describe the environment of the on-site process and the flexibility permitted because of that environment. Explain the application of survey techniques to both processes and organizations, as well as, differences in expected outcomes from each general category.)

3.3.1 Surveys (Place Different Kinds Here)

(The discussion should focus on the general or generic flow of a survey keeping in mind the intent of a survey is to determine capability to perform through observations, judgments, and objective evidence. Explain the processes and decision points identified as to purpose, data requirements, participants, decisions, and decision makers.)

3.3.2 Audits (Place Different Kinds Here)

(The discussion should focus on the general or generic flow of a audit keeping in mind the intent of an audit is to determine compliance, worth of requirements, and improvement opportunities through determinations based on objective evidence.)

3.4 OFF-SITE ACTIVITIES

3.4.1 Surveys (Place Different Kinds Here)

(The discussion should focus on the general or generic flow of a survey. Explain the processes and decision points identified as to purpose, data requirements, participants, decisions, and decision makers.)

3.4.2 Audits (Place Different Kinds Here)

(The discussion should focus on the general or generic flow of an audit keeping in mind the intent of an audit is to determine compliance, worth of requirements, and improvement opportunities through determinations based on objective evidence.)

4.0 RESOURCE IMPACTS

4.1 AUDITOR QUALIFICATIONS AND RESPONSIBILITIES

4.1.1 **Lead or Chair Auditor** (Senior Auditor Designated to Lead The Survey or Audit Activity)
4.1.2 **Senior Auditor** (Member of Audit Organization with Highest Skill Level in Audit Technology)

4.2 TRAINING AND CERTIFICATION

5.0 MEASUREMENTS AND TRENDS

5.1 SURVEYS (For both the activities surveyed and Survey Team Activity effectiveness and efficiency)

5.1.1 Data Collection
5.1.2 Data Processing
5.1.3 Indicators

5.2 AUDITS (For both activities surveyed and Audit Team Activity effectiveness and efficiency)

5.2.1 Data Collection
5.2.2 Data Processing
5.2.3 Indicators

6.0 PROGRAM REPORTS

REPORT DOCUMENTATION PAGE

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13. ABSTRACT *(Maximum 200 words)*

This document is the product of the KSC Survey and Audit Working Group composed of civil service and contractor Safety, Reliability and Quality Assurance (SR&QA) personnel. The program described herein, provides standardized terminology, uniformity of survey and audit operations, and emphasizes process assessments rather than a program based solely on compliance. The program establishes minimum training requirements, adopts an auditor certification methodology, and includes survey and audit metrics for the audited organizations, as well as, the auditing organization.

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